



EPA Region 7 TMDL Review

TMDL ID: IA 04-LDM-00215-L **Waterbody ID:** IA 04-LDM-00215-L
Waterbody Name: OTTUMWA LAGOON
Tributary: Kettle Creek, Unnamed Creek, Des Moines River (City Control Structure)
Pollutant: ALGAE, CHLORDANE, TURBIDITY
State: IA **HUC:** 07100009
BASIN: Des Moines River Basin
Submittal Date: 11/22/2005
Approved: Yes

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

The TMDL for Ottumwa Lagoon was formally submitted by the Iowa Department of Natural Resources (IDNR) in a letter received by EPA on November 22, 2005.

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

The pollutant loading capacity is set through the use of a model which calculates the annual total phosphorus (TP) load which will achieve a growing season mean total phosphorus concentration that will limit the growth of algae and its effect on water transparency. The total phosphorus loading capacity varies with proportion of the origin of the load. As an example of a load capacity, with internal load of 180 pounds (the present estimate) the allowable external load would be 680 pounds. As internally loaded phosphorus results in a greater growth of algae, the loads vary with proportion from origin. This relationship is given in the TMDL. At the previous example loads, this TMDL will result in a 75% reduction in total phosphorus loading and should result in attainment of applicable water quality standards.

The pollutant load for chlordane is set at zero. As the chlordane already in the system degrades or is removed through natural processes the waterbody should reach attainment of applicable water quality standards. In 2002 fish tissue monitoring composite channel catfish tissues showed concentrations of 0.78 mg/kg of technical chlordane. This TMDL should result in a 100% reduction of chlordane in fish tissues.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

Sources for total phosphorus are both point and nonpoint. Point sources are combined sewer overflows (CSOs #009 and #010) under IA NPDES #9083001 and a municipal separate storm sewer system (MS4) under IA NPDES #908303. Of these CSO #009 is estimated to have the largest load. Nonpoint sources include runoff from areas outside the CSO and MS4 systems and direct rainfall. The largest estimated nonpoint source is grasslands, which make up 32% of the land use in the watershed. An additional source is internal loading which is estimated for each pound to have the same effect as 2.4 pounds of externally loaded total phosphorus. Incidental sources identified include manure and wastes from wildlife and pets. These incidental sources will be evaluated in phase 2 if they are found to be significant. It appears all sources of total phosphorus have been considered.

Sources for chlordane are contaminated sediments from historic loads. Commercial use of chlordane has been banned since April 1988. No known sources exist in the watershed. It appears all sources of chlordane have been considered.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

Allocations are specified for both total phosphorus (to address algae and turbidity) and chlordane. The loads are specified as both WLA and LA.

WLA Comment

There are two point source discharges targeted for phosphorus reduction. The WLA is calculated as the relationship between internal and external phosphorus loading in the lake. As an example, with an internal load of 50 pounds per year, the WLA is set to 740 pounds per year (740 pounds for MS4 (NPDES IA 9083003) and zero pounds for CSOs (NPDES IA9083001)). The TMDL contains an equation to calculate WLA at differing levels of internal load.

There are no point sources for chlordane; the WLA is set to zero.

LA Comment

The load allocation for total phosphorus is calculated as the relationship between internal and external phosphorus loading in the lake. As an example, with an internal load of 50 pounds per year the external LA is set to 300 pounds per year. The TMDL contains an equation to calculate LA at differing levels of internal load. The internal load is considered part of the LA.

As there will be no further application of chlordane in the watershed the LA is set to zero.

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

The MOS for total phosphorus is explicit in that the loads were calculated based on in-lake concentrations 10% below the desired endpoint.

The MOS for chlordane is implicit in that two consecutive fish tissue samples must test below the FDA action level of 0.3mg/kg in fish tissue to meet the TMDL endpoint.

Designated uses of Ottumwa Lagoon are primary contact recreational use (Class A1) and aquatic life (Class B(LW)). In 1998 the A1 use was assessed as not supported because of observed combined sewer overflow (CSO) discharge into the lake by IDNR staff. In 2002 class A uses were assessed as partially supported and class B uses as partially supported.

For algae and turbidity the impairment is based on narrative standards which state that Ottumwa Lagoon should be "free from materials attributable to wastewater discharges or agricultural practices producing objectionable color, odor, or other aesthetically objectionable conditions." The presence of objectionable algal blooms, limited clarity, and the presence of nuisance algal species are linked to total phosphorus loading through the use of Carlson's Trophic State Index (TSI). The TSI uses a relationship between Secchi transparency (SD), algal biomass as chlorophyll a (CHLA), and total phosphorus (TP) derived from a set of reference temperate lakes. The target is a TSI (TP) <70, which should result in TSI (SD) and TSI (CHLA) <65.

For chlordane Iowa water quality standards state Class B waters "shall contain no substances in concentrations which will make fish or shellfish inedible due to undesirable tastes or cause a hazard to humans after consumption" (567 IAC 61.3(3)). The target for chlordane in fish tissues is the FDA action level of 0.3 mg/kg.

Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

The linkage for algae and turbidity is defined through Carlson's TSI. This linkage is indicated by a relationship between TP, chlorophyll, and water transparency seen in a group of reference lakes. Nutrient ratios suggest some phosphorus limitation. Additionally, phosphorus is targeted because of blue-green algae's ability to fix atmospheric nitrogen and the overabundance of phosphorus inputs. The Nurnburg Oxidic Lake Model is used to relate total phosphorus loading to growing season in-lake concentrations. Reductions in total phosphorus are expected to result in similar reductions in suspended solids. The load allocations and margin of safety do not exceed the load capacity.

The linkage for chlordane is direct and based on the concentration of chlordane in fish tissue (FDA action level 0.3mg/kg).

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

The TMDL for algae and turbidity was set for an annual loading of phosphorus that will result in meeting growing season targets.

The TMDL for chlordane applies throughout the year, seasonal variation is not a consideration.

Public Participation

Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

A public information meeting was held May 18, 2005 in Ottumwa. A second public meeting was held to present the draft TMDL to the public on October 17, 2005 at Ottumwa City Hall. The TMDL was made available on the Iowa DNR web site for public comment for 30 days or more with comments taken through November 14, 2005. Comments received were reviewed and incorporated into the TMDL.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

Monitoring for parameters associated with the algal and turbidity impairments will, at a minimum, meet the requirements established by 305(b) guidelines for water body assessment. This will consist of three lake samples per year for three years or five samples a year for two years. The data will be collected by 2010.

Follow-up fish tissue monitoring will continue biennially until two consecutive samples are below the FDA action level and at least one year of sampling indicates levels below one half of the FDA action level.

Reasonable assurance

Reasonable assurance only applies when reductions in nonpoint source loading is required to meet the prescribed waste load allocations.

Reasonable assurances do not apply.